DRAFT REGULATORY STANDARD

C-099 (REV. 1) (E)

REPORTING REQUIREMENTS FOR OPERATING NUCLEAR POWER PLANTS

Issued for public comments by the
Atomic Energy Control Board
September 1999

Atomic Energy Control Board | Commission de contrôle de l'énergie atomique

Canada

AECB Regulatory Documents

The AECB operates within a legal framework that includes law and supporting regulatory documents. Law includes such legally enforceable instruments as acts, regulations, licences and directives. Regulatory documents such as policies, standards, guides, notices, procedures and information documents support and provide further information on these legally enforceable instruments. Together, law and regulatory documents form the legal framework for the regulatory activities of the AECB.

The main classes of regulatory documents developed by the AECB are:

Regulatory Policy: a document that describes the philosophy, principles and fundamental factors used by the AECB in its regulatory program.

Regulatory Standard: a document that is suitable for use for compliance assessment and describes rules, characteristics or practices which the AECB accepts as meeting the regulatory requirements.

Regulatory Guide: a document that provides guidance or describes characteristics or practices that the AECB recommends for meeting the intent of regulatory requirements or improving administrative effectiveness.

Regulatory Notice: a document that provides case-specific guidance or information to alert licensees and others about significant health, safety or compliance issues that should be acted upon in a timely manner.

Regulatory Procedure: a document that describes work processes that the AECB follows to administer the regulatory requirements for which it is responsible.

Document types like regulatory policies, standards, guides, notices and procedures, do not create legally enforceable requirements. They support regulatory requirements found in regulations, licences and other legally enforceable requirements. However, if a regulatory document is suitable for use for compliance assessment, the AECB may make it into a legally enforceable requirement by incorporation in an AECB regulation or in a licence made pursuant to the *AEC Act*.

100-06379

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NOTICE

On March 20, 1997, Bill C-23, the *Nuclear Safety and Control Act* (*NSC Act*), received Royal Assent. New regulations that are derived from this Act will become law and replace the existing regulations. Draft Regulatory Standard C-099(Rev. 1) references the *NSC Act* and new regulations, which will come into force in 2000 on a date to be fixed by order of the Governor in Council.

About this Document

Comments

This document C-099(Rev.1), *Reporting Requirements for Operating Nuclear Power Plants*, is proposed to replace R-99, *Reporting Requirements for Operating Nuclear Power Facilities*, dated January 1, 1995. In order for interested persons to determine this document's impact and value, public comments are being solicited. At the end of the 60-day comment period, comments will be studied to determine how best to improve the document. Unless otherwise requested, a copy of all comments received will be placed in the Atomic Energy Control Board (AECB) Library in Ottawa. Comments on this standard will be most helpful if received in writing by December 15, 1999. Reference our file number 1-8-8-99, and direct enquiries and/or comments to the address below.

Document availability

The document can be viewed on the AECB internet website at www.aecb-ccea.gc.ca. A copy of C-099(Rev.1) may be ordered in English or French using the contact information below.

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APPENDIX A A.1

APPENDIX B B.1

* **Appendices** A and B to this standard have been in trial use at nuclear power plants during the past year, and are attached for completeness only. No additional comment is expected from licensees. Following the consultation period, the standard and the appendices will be edited as a complete document.

Purpose

This Regulatory Standard presents the reports that are mandatory for operating nuclear power plants, as a term or condition of the operating licence. Based on pertinent sections of the *Nuclear Safety and Control Act* (NSC Act, also called "the Act") and the *Class I Nuclear Facilities Regulations*, the information provided herein includes frequency of submission and content requirements.

Scope

This standard applies to any operating nuclear power plant, where it is specifically made applicable by the operating licence.

1. Introduction

1.1 Background

The Atomic Energy Control Board (AECB) is a federal regulatory agency with a mandate to assure that nuclear facilities and nuclear materials do not pose undue risk to health, safety, security and the environment.

At present, the AECB operates under the authority of the Atomic Energy Control Act and related regulations. However, these laws are to be replaced by the new *Nuclear Safety and Control Act* and new regulations in 1999. This legislation will come into force on a date to be fixed by order of the Governor in Council.

Under the NSC Act, the AECB will become the Canadian Nuclear Safety Commission (CNSC), with continuing responsibilities for regulation of the nuclear industry. Accordingly, this Consultative Document pertains to activities to be conducted under the authority of the NSC Act and the proposed *Class I Nuclear Facilities Regulations*. These regulations are currently under development.
This draft Regulatory Standard explains certain regulatory requirements that the CNSC proposes to incorporate in the operating licences that it issues — pursuant to the NSC Act and the *Class I*

Nuclear Facilities Regulations — to the operators of nuclear fission reactor installations that have been constructed for purposes of generating electricity or thermal energy on a commercial scale (hereinafter referred to as "nuclear power plants").

The AECB will take into account the public's comments on this Consultative Document when it finalizes the Standard for implementation under the new legislation.

Note: The Glossary in the Appendices of this document defines many of the terms used herein.

2. Event Reports: Prompt, Detailed, Additional Reports

Every licensee who operates a nuclear power plant shall make the following event reports, for any event described in 2.1 to 2.32, at the time specified in 2.33 to 2.37, and containing the information specified in this section:

- a Prompt Event Report,
- a written Detailed Event Report and,
- where the Detailed Event Report has been submitted incomplete, an Additional Event Report.

All event reports shall be submitted to the Project Officer or to the Director of the Power Reactor Division, or if neither individual can be contacted within the allotted times, the reports shall be submitted to the Duty Officer. Such reports are in addition to the requirements set out in the *General Nuclear Safety and Control Regulations* with respect to the *Bankruptcy and Insolvency Act*, the *Companies' Creditors Arrangement Act*, the *Winding-up Act* and in the *Radiation Protection Regulations* concerning the reporting of an occurrence resulting, or likely to result, in a dose of ionizing radiation in excess of any dose specified in the *Radiation Protection Regulations*.

Reportable Events

Non-compliance

2.1 Any contravention of, or failure to comply with, the Act; regulations made pursuant to the Act; or an order of the Commission, a designated officer or an inspector

Health and safety

2.2 Any contravention of, or failure to comply with, a licence condition

2.3 Failure to comply with any document specifically referenced in the operating licence, such as the Operating Policies and Principles

2.4 The death, serious illness or serious injury of any person at the nuclear power plant as a result of the licensed activity

2.5 An event that has resulted, or is likely to result, in the exposure of a person to ionizing radiation in excess of the applicable radiation dose limits referred to in the *Radiation Protection Regulations*

2.6 An event that could have caused a reportable dose of ionizing radiation under the *Radiation Protection Regulations*, but did not, due to fortuitous circumstances rather than to approved procedures

Release

2.7 A release of a radioactive nuclear substance, or other hazardous substance, into the environment in a quantity, or at a rate, exceeding that which is authorized by the licence

2.8 An unmonitored emission, where the upper limit of the release cannot be estimated or where the upper limit cannot be shown to be below the limits authorized in the licensing documents

Process systems

2.9 A serious process failure

2.10 An initiating event

2.11 A potential serious process failure

2.12 An event requiring a reactor shutdown in accordance with a condition of the licence or the Operating Policies and Principles

2.13 An event that results in an acute and unrecoverable loss of heavy water greater than 100 kg

Safety systems

2.14 An actuation of one or both shutdown systems from any power level, except:

(a) a reactor trip that occurs while the unit is in guaranteed shutdown state and where the actuation is not indicative of a failure or potential failure of the shutdown guarantee, or

(b) a reactor trip that was part of a pre-planned sequence

2.15 An actuation of the emergency core cooling system or subsystems, resulting from the initiating parameter exceeding the set point or any spurious operation or failure of the final controlled device separating the heat transport system from the

emergency core cooling system circuit

2.16 An actuation of the containment system or subsystems resulting from the initiating parameter exceeding the set point

2.17 A degradation of a special safety system or a relevant safety-related system that is hazardous to the radiological health and safety of any person, or that prevents a special safety system or a safety-related system from meeting its defined specifications

Pressure boundary

2.18 A discovery, in a registered system, of a pressure boundary degradation that exceeds a limit specified in the applicable design analysis, design codes or standards, or inspection codes or standards, and includes:

- **(a)** a pressure boundary deformation, crack or rupture, or a leakage in excess of a limit specified in the Operating Policies and Principles;
- **(b)** the occurrence of an abnormal loading transient that exceeds a pressure boundary design condition, or a Service Level B condition, for any nuclear component designed in accordance with the rules of the American Society of Mechanical Engineers (ASME) III subsection NB;
- **(c)** a change to the size, rating or material property of the pressure boundary beyond that allowed for in the design;
- **(d)** a repair or modification that changes the strength of a component of the pressure boundary, which did not receive the prior authorization required by Canadian Standards Association (CSA) *Standard N285.0*;
- **(e)** a local or general reduction of the wall thickness beyond that allowed in the design by the applicable pressure vessel code, standard or Act under which the pressure boundary was registered;
- **(f)** a degradation of the overpressure protection equipment for the pressure boundary, which contravenes a limit of the overpressure protection report or any other licensing document; or
- **(g)** confirmation, resulting from analysis of a registered pressure boundary degradation, that an applicable limit has been exceeded

Reactor and turbine control	**2.19**	A reduction of the effectiveness of any of the following systems, below the defined specifications (whether caused by failure, equipment inadequacy, improper procedures or inappropriate human action): **(a)** reactor power control; **(b)** the primary heat transport system pressure and inventory control; or **(c)** turbine protection
Safeguards	**2.20**	An interference with, or an interruption in, the operation of safeguards equipment or the alteration, defacement or breakage of a safeguards seal, other than in accordance with the safeguards agreement, the Act, the regulations made under the Act or the licence
	2.21	Theft, loss or sabotage of safeguards equipment or samples collected for the purpose of a safeguards inspection; damage to such equipment or samples; or the illegal use, possession, operation or removal of such equipment or samples
Security	**2.22**	Theft or loss of a nuclear substance, prescribed equipment or prescribed information
	2.23	An actual, attempted or threatenedact of sabotage
	2.24	A deficiency of the procedures or malfunction of the security system that results in a failure to comply with the *Nuclear Security Regulations* or with the power reactor operating licence
	2.25	An actual or threatened work disruption by workers, or an impending walkout, slowdown or strike that could affect the safety or security of nuclear power plant operations or the capability to maintain minimum staff complements, as described in *NSC Act* s.49
Emergency	**2.26**	A situation or an event that requires the implementation of a contingency plan defined in the licence
	2.27	Declaration of an alert or emergency, within the nuclear power plant, where personnel or resources are mobilized by the licensee in response to an unexpected occurrence of a radiological condition, chemical spill, fire, or potentially explosive mixture of gases that creates an actual hazard to the safe operation of the plant or to the safety of persons

External event

2.28 The occurrence of an earthquake that exceeds, at the site, the maximum free-field seismic instrumentation triggering level specified by *Standard CAN/CSA N289.5* or, where appropriate instrumentation is not available, the occurrence of an earthquake that is greater than magnitude 5 on the Richter scale within 500 kilometres of the site

2.29 The occurrence of any unusual external conditions at the site, including fire, flood, plane crash, gas explosion, gas release, high winds, missile or ice conditions, which results in operational transients

Testing and monitoring

2.30 Failure to perform a test required by a licence condition, including any routine test of a safety-related system required in the licensing documents, except in accordance with approved procedures

2.31 Failure to monitor or control a release path of radioactive material that is required to be continuously monitored and controlled, except in accordance with approved procedures

Documentation deficiency

2.32 Discovery of a problem arising from nuclear power plant operating experience, that reveals a hazard to the health and safety of persons, national security or the environment, that is different in nature, greater in probability, or greater in magnitude than was previously represented to the CNSC in the licensing documents, and includes the discovery of:

- **(a)** a special safety system that does not meet its defined specifications;
- **(b)** a reactor that is operating in a state that was not considered in the safety analysis;
- **(c)** the occurrence of an event of a type that was not considered in the safety analysis;
- **(d)** an unexplained and unexpected reactor core behaviour;
- **(e)** an event where two or more systems or components, which were assumed in the safety analysis to be mutually independent, are in fact interdependent;
- **(f)** a mistake in a licensing document that, if relied upon or acted upon, would increase the risk to health, nuclear safety and/or the environment; or
- **(g)** releases of radioactive nuclear substances and/or other hazardous substances that are found to be greater than those predicted in the safety analysis.

TIMING OF EVENT REPORTS

PROMPT EVENT REPORT: reportable as soon as possible

2.33 A licensee shall make a Prompt Event Report, as soon as possible after initiating the required response actions and alerting the required provincial and/or municipal authorities or station staff responsible for responding to an event, for the following reportable events:

(a) an ongoing emergency;

(b) a security incident, where a hazard to the health and safety of persons, national security or the environment continues to exist; or

(c) the loss or theft of a nuclear substance.

PROMPT EVENT REPORT: reportable within 24 hours

2.34 A licensee shall make a Prompt Event Report, within 24 hours, for the following reportable events:

(a) an actual or potential dose of ionizing radiation, as described in 2.5;

(b) release of radioactive nuclear substances in excess of the limits, as described in 2.5 and 2.7; or

(c) any theft, loss or interference with the operation of equipment installed by, or on behalf of, the International Atomic Energy Agency (IAEA), or of samples taken by, or on behalf of, the IAEA, as described in 2.20 and 2.21

PROMPT EVENT REPORT: reportable by the first business day following the event

2.35 A licensee shall make a Prompt Event Report, by the first business day following an event, for all reportable events described by 2.1 to 2.33 that are not covered by 2.34 and 2.35.

WRITTEN DETAILED EVENT REPORT: reportable within 45 calendar days after occurrence of the event.

2.36 Following up a Prompt Event Report, a licensee shall make a written Detailed Event Report for each reportable event described in 2.1 to 2.33, within 45 calendar days after the occurrence of the event.

ADDITIONAL EVENT REPORT: reportable as soon as the required information becomes available.

2.37 A licensee shall make an Additional Event Report when a Detailed Event Report has been submitted incomplete due to any of the following reasons:

(a) unavailability of the relevant information,

(b) ongoing investigation, or

(c) the discovery of new information.

The Additional Event Report shall be made, in writing, as soon as the required information becomes available.

CONTENT: PROMPT EVENT REPORT

PROMPT EVENT REPORT: brief description of event

2.38 The date and time of the event, if known, or a statement of the best estimate thereof

2.39 Identification of the plant and any reactor unit(s) affected

2.40 Identification of any systems, components, functions or personnel affected

2.41 A brief description of the event

CONTENT: DETAILED EVENT REPORT

Background information

2.42 The date and time of the event, if known, or a statement of the best estimate of date and time of the event

2.43 Identification of the plant and any reactor unit(s) affected

2.44 Any systems, components, functions or personnel affected

2.45 Reference to the primary provisions of reportable events 2.1 to 2.32, the licence condition(s), or the regulations under which the event is reportable

Event description and evaluation

2.46 A brief description of how the event occurred

2.47 If applicable, the municipal, provincial and federal authorities that were notified of the event

2.48 A detailed account of the event

2.49 A description of the condition of the event site and, if relevant, the operating conditions of the power reactor unit(s) involved in the event, including operational reactor power level(s) prior to the event

2.50 A description of any actions taken in immediate response to the event

2.51 A detailed account of the causes of the event and its consequences, including, where relevant, any that have been established by investigative process

2.52 For an event with human performance implications, the root-cause analysis of the event

2.53 A statement of the safety significance of the event, including, if the event is an actuation of either shutdown system, a statement as to whether the event was or was not a serious process failure

2.54 Any resulting doses, or dose estimates, to the facility personnel or to the public

2.55 Any evaluation of the degree of impairment of special safety systems or of a safety-related system

2.56 A statement as to whether a review has been carried out and

account has been taken of similar related events

2.57 Any resulting impact on the environment

Corrective action

2.58 The corrective actions taken, or proposed to be taken, to prevent a recurrence of the event or to correct the situation, including, for an event that involves inappropriate human actions, those actions that result from a root-cause analysis

2.59 Comments and/or recommendations of the plant management, including comments on the appropriateness of the actions taken by operating staff

Completeness of report

2.60 A statement addressing whether the Detailed Event Report is complete, or whether an Additional Report will be made and, if so, the Additional Report number that has been assigned

2.61 Signature of the designated representative of the licensee

CONTENT: ADDITIONAL EVENT REPORTS

Updated information

2.62 The required information that is missing from the Detailed Event Report

2.63 Any necessary correction of information in the Detailed Event Report

Completeness of report

2.64 A statement as to whether or not the Additional Report is complete and all necessary follow-up actions have been taken

2.65 Signature of the designated representative of the licensee

3. Operation Quarterly Reports

Every licensee who operates a nuclear power plant shall make, for each quarter of a calendar year, a written or electronic Operation Quarterly Report. The reports shall be submitted to the Project Officer or to a person authorized by the Commission to receive the reports.

TIMING

Quarterly submission

3.1 Each quarterly report shall be submitted within ninety days of the end of the period covered by the report, except the fourth quarterly report for the calendar year, which shall be submitted by March 1 of the next calendar year.

CONTENT

Staffing update

3.2 A summary of changes in station personnel organization and staffing, procedure, equipment or fuel design, which could impact upon the Safety Report (5.0) or other licensing documents

3.3 A list of the names of all persons occupying a certified position and — for each person occupying a certified shift position — any temporary assignment to another position, the position filled during this assignment, and the assignment commencement date and duration

Summary of reports submitted

3.4 A list of the events requiring report under 2.1 to 2.30 of this document, which occurred during the reporting period, including a brief description, with report titles and numbers except for any security event referred to in 2.21 to 2.23

3.5 A list and/or brief description of the Additional Event Reports described in 2.20 for events other than security-related events, which were submitted during the quarter. Such list or description shall contain titles and numbers of the Detailed Event Reports that were submitted, and those intended for submission

Systems important to safety

3.6 Identification of events that occurred when systems important to safety were unable to meet their defined specifications. The fourth quarterly report for each calendar year shall also include the reliability performance indices for each system important to safety (refer to details in *Regulatory Guide G-98*, 2.30)

Monitoring

3.7 The results of monitoring of routine radioactive effluent and other hazardous substances specified in the licence, including, for each month of the quarter, the total activity released and the cooling water flow volume

3.8 The results of non-routine off-site monitoring that was triggered as a result of any unplanned release of radioactive nuclear substances or other hazardous substances

Surveys

3.9 A summary of the results of:

- **(a)** all routine surveys of the radiation field,
- **(b)** all routine surveys of the surface contamination,
- **(c)** the concentration of airborne radioactive materials that were taken in various locations within the plant
- **(d)** any assessment to detect increases of radiation hazard over time

Exposure

3.10 The dose, received by any person, that resulted from any event described in paragraphs 2.5 and 2.6, the collective dose of all workers and dose statistics for the various groups of workers

Exercises

3.11 A summary of emergency exercises and drills that were carried out, and a description of any change made to non-security-related emergency procedures. Once per year, one quarterly report shall also include the results of the annual review, conducted by the licensee, of the off-site emergency procedures and of the arrangements with off-site authorities involved in these procedures;

Prescribed substances

3.12 The acquisition and transfer of prescribed substances, including any revisions to the inventory to account for radioactive decay. The fourth quarterly report for each calendar year shall also include the inventory as of year end.

Fires

3.13 The number of fires that occurred at the plant, with an evaluation of their safety significance

Performance indicators

3.14 A report of the safety-related station Performance Indicator data in accordance with the Specification Sheets in Appendix A and Data Sheets in Appendix B

4. Security Quarterly Reports

Every licensee who operates a nuclear power plant shall make, for each quarter of the calendar year, a written or electronic Security Quarterly Report. Reports shall be submitted to the Project Officer or to a person authorized by the Commission to receive the reports.

TIMING

4.1 The Security Quarterly Report shall be submitted within ninety days of the end of the period covered by the report, except the fourth Security Quarterly Report for the calendar year, which shall be submitted by March 1 of the next calendar year.

CONTENT

Changes

4.2 A summary of changes in station security organization and staffing, procedure or equipment that could impact the licensing Security Report;

Events

4.3 A list and /or a brief description of the security events, including report titles and numbers, of the reportable events specified under 2.2 to 2.25 that occurred during the reporting period

Update reports

4.4 A list and /or brief description of Additional Reports required under 2.36, which were submitted during the quarter for security-related events and of those that remain to be submitted

for security-related events, with the report titles and numbers;

Other information

4.5 The number of escorted visitors in the protected area (visitor days)

4.6 The total number of entries and exits of vehicles to and from the protected area at each point of entry

4.7 A summary of security exercises and drills that were carried out during the quarter

System performance

4.8 A history of failure and impairment of the security system equipment and a summary of faults, combinations of faults, or events that prevented the security systems from meeting their defined specifications

5. Safety Reports

Every licensee who operates a nuclear power plant shall review the Safety Report, and submit an update, in writing or electronically to the Project Officer or to a person authorized by the Commission to receive the report.

TIMING

5.1 The description of the nuclear power plant in the Safety Report shall be submitted every three years from the last update.

5.2 Each analysis of the Safety Report for the nuclear power plant shall be reviewed every three years and revised where necessary to ensure its continued validity. Any revised analysis shall be submitted to the Commission within three years from the last update, unless otherwise approved in writing by the Commission or by a person authorized by the Commission.

CONTENT

5.3 The Safety Report update shall include, where necessary, a revised description of the changes made to the site, structures and systems of the nuclear power plant.

5.4 The update of the analyses of the Safety Report shall take into consideration necessary changes resulting from any event or occurrence, that was reported pursuant to subsection 2.2 to 2.30, which brings the validity of the results of the analyses into question. In such cases, the analyses shall be repeated using current methods and information, and the new results forwarded to the Commission for incorporation into the Safety Report.

6. Environmental Monitoring Reports

Every licensee who operates a nuclear power plant shall make, in writing, an annual report of the results of the environmental monitoring program. The report shall be submitted to the Project Officer or to a person authorized by the Commission to receive the report.

TIMING

6.1 The report shall be submitted by May 1 of the next calendar year.

CONTENT

6.2 An analysis of the results of the environmental monitoring program

6.3 The individual doses that were calculated as doses to the critical group

6.4 A description of the dosimetric models used

6.5 A review of the environmental monitoring quality assurance program

6.6 Any unusual findings during the calendar year.

7. Research and Development Progress Reports

Every licensee who operates a nuclear power plant shall make a written annual Research and Development (R&D) Progress Report. Reports shall be submitted to the Project Officer or to a person authorized by the Commission to receive the reports.

TIMING

7.1 The R&D Progress Report shall be submitted by July 1 of the next calendar year.

CONTENT

7.2 The progress report shall describe research and development programs that are planned or are being carried out during the calendar year, or that are planned for future years, to resolve safety issues. The report shall describe schedules, milestones and results of the programs.

8. Problem Reports: Analysis or Research and Development

Every licensee who operates a nuclear power plant shall make a written Analysis or Research and Development (R&D) Problem Report for the discovery of a safety problem, arising from research findings or improved methods for safety analysis, that reveals a hazard to radiological health or nuclear safety; or that is different in nature, greater in probability, or greater in magnitude than was previously represented to the CNSC in the licensing documents.
Reports shall be submitted to the Project Officer or to a person authorized by the Commission to receive the reports.

Reportable Problems

Invalid or inadequate information

8.1 The discovery that assumptions, inputs, analytical methods or results of the safety analyses may be invalid

8.2 Information revealing that the limits in the Operating Policies and Principles document, or in the appendices to the document, are inadequate

8.3 Information revealing that the analyses from which the limits in the Operating Policies and Principles document were derived may be invalid or uncertain, such that the minimum margins of safety are less than predicted

8.4 Information revealing that the defined specifications of a special safety system or of a safety-related system are invalid

8.5 The discovery of a mistake in a licensing document that, if relied upon or acted upon, would increase the risk to the environment and to the health and safety of persons

8.6 Information revealing that the measures for protecting the environment are inadequate

Timing

8.7 For all problems referred to in 8.1 through 8.6 above, a licensee shall submit to the CNSC a written Problem Report within 21 calendar days after the licensee has been notified of the problem

Content

8.8 Where relevant, identification of the plant and reactor unit(s) affected

8.9 Where relevant, identification of the systems, components or functions affected

8.10 A statement of the safety significance of the problem

8.11 Where relevant, an evaluation of the degree of impairment of any special safety system or safety-related system

8.12 Corrective actions taken or proposed to be taken to correct the situation

8.13 Signature of the designated representative of the licensee

9. Periodic Inspection Program Reports

Following a scheduled maintenance outage, every licensee who operates a nuclear power plant shall make a Periodic Inspection Program Report, in writing, to the Project Officer or to a person authorized by the Commission to receive the reports.

TIMING

9.1 The reports shall be submitted within 90 days of the completion of a scheduled maintenance outage.

CONTENT

9.2 The Periodic Inspection Program Reports shall describe the results of any inspection carried out in accordance with the Periodic Inspection Program requirements of *CSA Standards N285.4 and N285.5*

Note: Requirements to report reliability on an annual basis do not relieve the licensee of obligations (1) to detect any unacceptable decline in reliability, and (2) to respond by taking appropriate

10. Reliability Reports

Every licensee who operates a nuclear power plant shall submit an annual Reliability Report in writing to the Project Officer or to a person authorized by the Commission to receive the report. The Reliability Report shall contain an evaluation, for the calendar year being reported, of the reliability of each system important to safety, as detailed in *Regulatory Guide G-98*

TIMING

10.1 The annual Reliability Report shall be submitted by April 1 of the year that follows the reporting period.

CONTENT

10.2 A list of incidents during which systems important to safety were unable to meet their defined specifications

10.3 A listing and description of unsafe component faults of systems important to safety

10.4 Reliability Performance Indices of systems important to safety

10.5 The predicted reliability of each system important to safety using the latest failure data

10.6 A comparison between the predicted reliability, the reliability performance indices and the reliability targets for each special safety system

10.7 An impairment report for each system important to safety

10.8 A description of changes made to the system design, operating or maintenance practices, which affected the predicted reliability of the systems important to safety

10.9 A description of changes made to the reliability model of systems important to safety

10.10 A listing of surveillance activities that have been credited in the reliability assessments and identification of missed activities

10.11 The component failure rates used in the reliability assessments and the site-specific failure data

10.12 The human interaction data used in the reliability assessments

10.13 The common cause failure data used in the reliability assessments.

11. Fissionable and Fertile Substances Reports

Every licensee who operates a nuclear power plant shall make, to the Commission, reports on the inventory and transfer of fissionable and fertile substances, in accordance with AECB-1049, *Reporting Requirements for Fissionable and Fertile Substances.*

12. Certified Personnel Notification Reports

Reportable Information

Every licensee who operates a nuclear power plant shall make, in writing to the Project Officer or to a person authorized by the Commission to receive the reports, a Certified Personnel Notification report, as stated below.

12.1 Upon becoming aware that a certified person meets any of the conditions of the Commission *Standard for the Certification of Staff at Nuclear Power Plants,* s.9 (Decertification)

12.2 Upon removing a person from a certified shift position for any

reason, unless a Certified Personnel Notification report has previously been submitted in accordance with 12.1

TIMING

12.3 The Certified Personnel Notification report shall be submitted within 7 calendar days of the licensee becoming aware that a certified person meets any of the conditions of S.9 (Decertification), of the *Standard for the Certification of Staff at Nuclear Power Plants*, or within 7 calendar days of removing a person from the certified position, unless otherwise approved in writing by the Commission or a person authorized by the Commission.

CONTENT

12.4 The name and position of the person, and the condition that would justify decertification or the reason for removal of the person from the certified position

Glossary

Act	*Nuclear Safety and Control Act* (NSC Act)
AECB	Atomic Energy Control Board
ASME	American Society of Mechanical Engineering
certified	certified by the Commission under paragraph 21(1)(I) of the Act or by a designated officer authorized under paragraph 39(2)(b) of the Act indicating that a person is certified
certified position	a position, referred to in the nuclear plant operating licence, requiring written permission of the CNSC to allow an individual to perform the duties and exercise the responsibilities of that position
certified shift position	the certified position of shift supervisor, reactor control room operator and, where applicable, unit 0 control room operator
CNSC	Canadian Nuclear Safety Commission, also called "the Commission," established by section 8 of the *Nuclear Safety and Control Act*
common cause failure	a dependant failure in which two or more component fault states exist simultaneously or within a short time interval and are a direct result of a shared cause
designated officer	a person designated as a designated officer under section 37 of the Nuclear Safety and Control Act
defined specifications	the criteria set out in the licensing documents for a special safety system or a safety-related system that designate the minimum functional capability and performance levels required for effectiveness

discovery of a problem	the earliest time when the licensee uncovers a situation revealing a health, safety, security or environmental problem or decides that specific resources should be allocated to ascertain whether or not such a problem exists
hazardous substance or hazardous waste	a substance or waste, other than a nuclear substance, that is used to connection with or produced in the course of carrying on a licensed activity and that may pose a risk to the health ans safety of persons or to the environment
IAEA	International Atomic Energy Agency
impairment report	a report of the impairment history of the system for a given time, and includes, for each impairment, its duration and an assessment of the ability of the system to perform with respect to the reliability measures in the licensing documents
initiating event	an event (such as loss of instrument air, loss of class IV power, loss of main feedwater etc.) which initiates a sequence that could lead to a serious process failure in the absence of action by any other system important to safety e.g., setback stepback, auxiliary feedwater etc. needed to prevent a serious process failure
inspector	a person designated as an inspector under section 29 of the *Nuclear Safety and Control Act*
licence	a licence issued under section 24 of the *NSC Act*
licence condition	a requirement of a power reactor operating licence (PROL)
licensed activity	an activity described in paragraph 26(e) of the Act that a licence authorizes the licensee to carry on in relation to a Class I nuclear facility

licensee	a person who is licensed to carry on an activity described in paragraph 26(e) of the *NSC Act* in relation to a Class I nuclear facility
NSC Act	*Nuclear Safety and Control Act*
nuclear energy	any form of energy released in the course of nuclear fission or nuclear fusion or of any other nuclear transmutation
nuclear energy worker	a person who is required, in the course of the person's business or occupation in connection with a nuclear substance or nuclear facility, to perform duties in such circumstances that there is a reasonable probability that the person may receive a dose of radiation that is greater than the prescribed limit for the general public
nuclear facility	any of the following facilities: **(a)** a nuclear fission or fusion reactor or subcritical nuclear assembly, **(b)** a particle accelerator, **(c)** a uranium or thorium mine or mill, **(d)** a plant for the processing, reprocessing or separation of an isotope of uranium, thorium or plutonium, **(e)** a plant for the manufacture of a product from uranium, thorium or plutonium, **(f)** a plant for the processing or use, in a quantity greater than 10^{15} Bq per calendar year, of nuclear substances other than uranium, thorium of plutonium, **(g)** a facility for the disposal of a nuclear substance generated at another nuclear facility, **(h)** a vehicle that is equipped with a nuclear reactor, and power

nuclear power plant	a facility that employs one or more power reactors to generate electric or thermal energy on a commercial scale
nuclear substance	**(a)** deuterium, thorium, uranium or an element with an atomic number greater than 92, **(b)** a derivative or compound of deuterium, thorium, uranium or of an element with an atomic number greater than 92, **(c)** a radioactive nuclide, **(d)** a substance that is prescribed as being capable of releasing nuclear energy or as being required for the production or use of nuclear energy **(e)** a radioactive by-product of the development, production or use of nuclear energy, and **(f)** a radioactive substance or radioactive thing that was used for the development or production, or in connection with the use, of nuclear energy
Operating Policies and Principles	a document identified as the Operating Policies and Principles in the licensing documents, that sets out the authorities and responsibilities of managerial and operating staff, and the principles and guidelines to be followed for safe operation of the plant systems
potential serious process failure	an event that could have become a serious process failure, but did not, due to fortuitous circumstances rather than design provisions or approved procedures
predicted reliability	the reliability of a system in its nominal state during some future period and/or, for poised systems, at some future time
prescribed	prescribed by regulation of the CNSC

prescribed equipment	the equipment prescribed by section 19 of the *General Nuclear Safety and Control Regulations*
prescribed information	the information prescribed by section 20 of the *General Nuclear Safety and Control Regulations*
pressure boundary	any pressure-retaining vessel or system component that is subject to registration or that is registered under the applicable boiler and pressure vessel legislation, whether a conventional system or a nuclear system
prompt event report	information transmitted in a verbal or other form acceptable to the CNSC
radiation	the emission by a nuclear substance, the production using a nuclear substance, or the production at a nuclear facility of, an atomic or subatomic particle or electromagnetic wave with sufficient energy for ionization
reliability	the probability that a system in a given state will be able to perform a stated mission under stated conditions according to its defined specifications for a stated mission time and/or, for poised systems, when required to do so
reliability performance indices	the actual experienced reliability measure for a system over a specific period of time, expressed in terms of failure rate (time, demand based), availability or reliability
safeguards	a verification system that is established in accordance with a safeguards agreement

safety-related system	those structures, systems and components that either are identified as safety-related in the licensing documents, or whose malfunction or failure could lead directly to radiation exposure of site personnel or the public, or could directly increase the severity of accidental releases of radioactive material from the plant
serious process failure	a failure of a process system, component, structure, or an inappropriate procedure or human action: **(a)** that led to a systematic fuel failure or to a significant release from the plant, or **(b)** that could have led to a systematic fuel failure or a significant release in the absence of action by any special safety system
significant release	a release of radioactive material that arises from an event and that results in a whole body or committed effective dose in excess of 0.0005 Sv (50 mrem) or a committed or received thyroid dose of 0.005 Sv (500 mrem) to the most exposed member of the public at or beyond the exclusion boundary
special safety system	the shutdown system no.1, the shutdown system no. 2, the containment system, or the emergency core cooling system
surveillance activities	the activities of monitoring, checking, testing, calibration or inspecting systems or components related to assuring that the systems important to safety remain capable of meeting their defined specifications
systematic fuel failure	fuel that has no defect prior to an event, fails or exceeds the fuel integrity criteria defined in the licensing documents as a result of the event
system important to safety	a system associated with the initiation, detection, prevention or mitigation of any failure sequence which could lead to damage to the fuel and the release of radionuclides

unacceptable decline in reliability	a safety-related system, subsystem or component that: **(a)** does not meet the predicted reliability targets that are set out in the licensing documents or **(b)** shows a continued trend of reduced reliability such that those targets will not be met
unsafe component fault	the condition of a component, whether due to a failure, maintenance outage or any other reason for removing the component from service, that increases the probability of the system being unable to meet its defined specifications
written report	information transmitted in a written or electronic form acceptable to the CNSC

Appendices

A: Performance Indicator Specification Sheets
B: Performance Indicator Data Sheets

Consultation Notice

Appendices A and B to this standard have been in trial use at nuclear power plants during the past year, and are attached for completeness only. No additional comment is expected from licensees. Following the consultation period, the standard and the appendices will be edited as a complete document.

APPENDIX A

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**ACCIDENT SEVERITY RATE** (1)
2.	Purpose:	To indicate the accident severity rate at Canadian nuclear generating stations. To monitor performance in meeting nuclear industry standards in the area of worker safety. To compare performance between Canadian CANDU nuclear generating stations and internationally.
3.	Definition:	The accident severity rate is the total number of days lost or charged for all disabling injuries per 200 000 person hours worked at a station.
4.	Calculation:	Accident Severity Rate = No. days / 200 000 person hrs
5.	Attribute:	Reactive
6.	Coverage:	Global
7.	Performance Areas:	Worker Safety
8.	Primary Area:	Worker Safety
9.	Data:	See attached Data Sheet
10.	Data Applicability:	Station
11.	Trending Frequency:	Quarterly
12.	Comparability:	World
13.	Means by which AECB will present data (no licensee input required):	

14. Notes:

14.1 The Canadian federal reporting requirement for severity includes shifts not worked. For example, a person is hurt on the last regularly scheduled shift and then is away for two days that were regularly scheduled off. If the person would not have been able to work those two days, but was able to return to work on the first regularly scheduled day, those two days would be counted as lost days.

14.2 Recurrent injuries are attributed back to the originating accident. For example, if an injury from an accident that resulted in a lost time injury occurred in 1994, recurred in 1996 (with no new accident) the lost days would not appear in 1996 totals. These days are attributed back to 1994.

14.3 Factors which can influence the length of recovery, such as compensation programs, should be considered when making comparisons

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**CHEMISTRY INDEX** (2)
2.	Purpose:	To indicate long-term unit control of important chemical parameters. To monitor performance in meeting licensee's requirements in chemistry. To compare performance between Canadian CANDU units.
3.	Definition:	The average percent success in the monitoring/sampling (for validity, frequency and range) of selected chemical parameters, for the quarter.
4.	Calculation:	Chemistry Index (%) = $(\sum^m a_1/A_1 , a_2/A_2,... a_m/A_m) /m$

a_1: number of successful samples for parameter 1 during the quarter;
A_1: number of required samples for parameter 1 for the quarter. The sampling period is based on the licensee program;
a_1/A_1: ratio of success for parameter 1;
m: number of parameters monitored during the period, usually the 12 parameters on the list below.

$(\sum^m a_1/A_1 , a_2/A_2,... a_m/A_m)$: sum of individual success ratios for each parameter monitored in the index.

All data is dimensionless. Chemistry Index (CI) results will range between 0 % and 100 %.

Parameters Monitored:

PHT:
- pH_a
- dissolved D_2

Annulus Gas $[O_2]$

Steam Generators:
- dissolved [Cl]
- $[SO_4]$
- [Na]

Feedwater:
- dissolved $[O_2]$
- suspended iron
- suspended copper (both copper and iron measured on a 0.45 micron filter paper)
- hydrazine

Condensate Extraction Pump
- dissolved $[O_2]$
- pH_a

5.	Attribute: Predictive/Reactive
6.	Coverage: Program
7.	Performance Areas: Operations
8.	Primary Area: Operations
9.	Data: See attached Data Sheet
10.	Data Applicability: Unit
11.	Trending Frequency: Quarterly
12.	Comparability: CANDU
13.	Means by which AECB will present data (no licensee input required):
14.	Notes:

14.1 "Success": measurement of a parameter is taken according to the specified minimum frequency, is valid and within range; "valid": a given sample is representative, acceptable to the licensee chemistry department; "within range": the result is within the acceptability range defined by the licensee, where no further action is required of the licensee.

14.2 A missed scheduled minimum measurement cannot be credited later, past the allowable period. When the safety of chemical technicians or employees could be adversely affected by new hazards, during normal execution of their tasks, or when the status of the plant is such that the chemical measure is useless, or unrepresentative, the representative period will be adjusted without penalty. Such measures will be qualified "void". The data should be auditable.

14.3 The minimum sampling/monitoring frequency is determined by the licensee's current requirements. It is not permissible to increase sampling frequency in order to reduce the effect of missed or failed previous or future anticipated failures in sampling.

14.4 Sampling or monitoring equipment failure or unavailability of personnel are not valid reasons for voiding results. Such results are "failures".

14.5 Where on-line monitoring equipment is available, the success ratio will be calculated as the ratio of time where the monitoring is on-line and valid data is available and within range over total time. When monitoring equipment fails, it is permissible to replace the monitoring with manual sampling techniques at a reasonable frequency.

14.6 The failure period starts from the last valid sample, until the sample is a success.

14.7 Parameters making up the list of the index, and the rules of success, failures, validity and voiding are reviewed by the AECB.

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**COMPLIANCE CHEMISTRY INDEX** (3)
2.	Purpose:	To indicate unit control of safety-related chemical and radiochemical parameters. To monitor performance in meeting regulatory and licensee requirements in chemistry. To compare performance between Canadian CANDU units.
3.	Definition:	The average percent success in the monitoring/sampling (for validity, frequency and range) of selected chemical parameters, for the quarter. The list is found in section 4. below.

4. Calculation:
Sampling frequencies and specifications should be defined in the station's operating documentation. Rules for calculation of the chemistry index in section 3.1 apply also to this compliance chemistry index. The parameters are selected as compliance parameters in accordance to most OP&P requirements and on the basis of safety.

List of Parameters Monitored:
Gadolinium isotopic analysis (or boron) (for depletion of neutron absorbing isotopes) for all batch lots prior to their use in reactor systems;
poison injection tanks [Gd] (unit not in GSS);
poison injection tanks pH_a during GSS;
Moderator D_2O isotopic (unit not in GSS);
$[H_3]$ (unit not in GSS);
excess reactivity (unit not in GSS);
dissolved $[D_2]$ (unit not in GSS);
cover gas $[D_2]$ (unit not in GSS);
[Gd] during GSS;
D_2O conductivity during GSS (except for G-2);
pH_a during GSS;
PHT D_2O isotopic (unit not in GSS);
$[H_3]$ (unit not in GSS);
$[I_{131}]$ concentration (unit not in GSS);
D_2O storage tank cover gas $[D_2]$;
[Cl];
Moderator to heat transport coolant D_2O isotopic purity difference (unit not in GSS);
Annulus gas dewpoint (unit not in GSS);
End shield cooling water pH_a;
cover gas $[H_2]$ (for Point Lepreau, G-2 and Pickering B);
Emergency coolant injection high pressure tanks water pH_a;
hydrazine concentration;
Liquid zone control cover gas $[H_2]$

5.	Attribute:	Predictive/Reactive
6.	Coverage:	Program
7.	Performance Areas:	Operations, Compliance
8.	Primary Area:	Compliance
9.	Data:	See attached Data Sheet
10.	Data Applicability:	Unit

11. Trending Frequency: Quarterly
12. Comparability: Canadian
13. Means by which AECB will present data (no licensee input required):
14. Notes: 14.1 "Success": measurement of a parameter is taken according to the specified minimum frequency, is valid and within range; "valid": a given sample is representative, acceptable to the licensee chemistry department; "within range": the result is within the acceptability range defined by the licensee, where no further action is required of the licensee. 14.2 A missed scheduled minimum measurement cannot be credited later, past the allowable period. When the safety of chemical technicians or employees could be adversely affected by new hazards, during normal execution of their tasks, or when the status of the plant is such that the chemical measure is useless, or unrepresentative, the representative period will be adjusted without penalty. Such measures will be qualified "void". The data should be auditable. 14.3 The minimum sampling/monitoring frequency is determined by the licensee's current requirements. It is not permissible to increase sampling frequency in order to reduce the effect of missed or failed previous or future anticipated failures in sampling. 14.4 Sampling or monitoring equipment failure or unavailability of personnel are not valid reasons for voiding results. Such results are "failures". 14.5 Where on-line monitoring equipment is available, the success ratio will be calculated as the ratio of time where the monitoring is on-line and valid data is available and within range over total time. When monitoring equipment fails, it is permissible to replace the monitoring with manual sampling techniques at a reasonable frequency. 14.6 The failure period starts from the last valid sample, until the sample is a success. 14.7 Parameters making up the list of the index, and the rules of success, failures, validity and voiding are reviewed by the AECB.

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**CHANGE CONTROL INDICES** (4)
2.	Purpose:	To indicate the control over changes in equipment and procedures for the safety-related systems at Canadian nuclear generating stations. To monitor performance in the management of change for the safety-related systems.
3.	Definition:	Change control indices are defined as factors important for maintaining control over equipment and procedural changes.
4.	Calculation:	
4.1	Number of temporary procedural changes (number of pages) (see note 14.1).	
4.2	Number of temporary equipment changes.	
4.3	Number of incomplete permanent equipment changes (see note 14.2).	
4.4	Number of temporary equipment and procedural changes over six months old (listed separately).	
4.5	Number of instances where changes in equipment and/or procedures contributed to an event as recorded by the licensee.	
5.	Attribute:	Predictive
6.	Coverage:	Global
7.	Performance Areas:	Operations, Maintenance
8.	Primary Area:	Operations
9.	Data:	See attached Data Sheet
10.	Data Applicability:	Unit
11.	Trending Frequency:	Data collected monthly and submitted to the AECB each quarter.
12.	Comparability:	Station
13.	Means by which AECB will present data (no licensee input required):	

14. Notes:

14.1 All equipment or procedural changes for the indicator shall include the safety-related systems identified by the station staff according to S-99.

14.2 Permanent changes are considered incomplete until all testing, design, installation and operating documentation have been amended according to the changes in the field.

14.3 All data gathered shall be presented on a quarterly basis, as described in the data sheet.

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**EMERGENCY PREPAREDNESS DRILL COMPLETION RATIO** (5)
2.	Purpose:	To indicate adherence to licensee's requirements on emergency preparedness drills. To compare performance between Canadian nuclear generating stations. To be used as a component in the measurement of emergency preparedness.

3. Definition:

3.1 A drill is a means by which a licensee tests and evaluates through simulation the capability of the station's planning, procedures, resources, and staff training to respond to an emergency.

3.2 Each drill evaluates the response capability of a single crew, team, or unit, and uses the actual facility and staff.

3.3 Examples of the type of emergency for which drills are conducted include but are not limited to radiation, fire, search and rescue, first-aid, contaminated casualty, and hazardous materials.

3.4 Station-wide exercises and practices (e.g., rehearsals, walk-through, table-top training) are not included in this definition.

4. Calculation:

Emergency Preparedness Drill Completion Ratio = number of drills completed by the end of each quarter/number of drills scheduled that year

$$= \frac{\sum_i \sum_j c_{ij}}{\sum_i \sum_j s_{ij}}$$

where
- c = number of completed drills at the end of each quarter
- s = number of scheduled drills for the year
- i = crew
- j = drill type

$c_{ij}^{max} = s_{ij}$, if $c_{ij} < s_{ij}$ $\forall$ i,j

5.	Attribute:	Predictive
6.	Coverage:	Program
7.	Performance Areas:	Public Safety, Worker Safety
8.	Primary Area:	Public Safety

9.	Data: See attached Data Sheet	
10.	Data Applicability:	Station
11.	Trending Frequency:	Quarterly
12.	Comparability:	Canadian
13.	Means by which AECB will present data (no licensee input required):	
14.	Notes:	
14.1	A drill schedule that shows the annual commitment of different drill types for each crew is to be produced by each licensee, and be brought to the attention of the AECB prior to the beginning of the year.	
14.2	Completed drills are reported to the AECB in the quarterly technical reports, pursuant to sections 3.11 and 4.7 of S-99.	
14.3	Reporting must depict clearly the number of drills completed, and the crew or team that completed them.	
14.4	Drills testing the interfaces between crews and teams may take place concurrently.	
14.5	Overachievement by one crew or team will not be credited unless all crews and teams have completed the scheduled drills.	

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title: **EMERGENCY RESPONSE EQUIPMENT CALL-UP COMPLETION RATIO** (6)	
2.	Purpose:	To indicate adherence to a licensee's requirements for completing scheduled maintenance, inventory checks and testing of dedicated emergency response equipment as set out in the document referenced in A.A.4 of the operating licence. To compare performance between Canadian nuclear generating stations. To be used as a component in the measurement of emergency preparedness.
3.	Definition:	The ratio is the number of completed maintenance, inventory checks and tests for all equipment dedicated to emergency response to that which was scheduled in a quarter.
4.	Calculation:	Emergency Response Equipment Call-Up Completion Ratio = number of emergency equipment maintenance, inventory checks and testing call-ups completed in a quarter/number scheduled that quarter $= \frac{c}{s}$ where: c = number of completed call-ups; and s = number of scheduled call-ups.
5.	Attribute:	Predictive
6.	Coverage:	Program
7.	Performance Areas:	Public Safety, Worker Safety
8.	Primary Area:	Worker Safety
9.	Data: See attached Data Sheet	
10.	Data Applicability:	Station
11.	Trending Frequency:	Quarterly
12.	Comparability:	Canadian
13.	Means by which AECB will present data (no licensee input required):	

14. Notes:

14.1 The types of emergency to be covered extend beyond those related only to radiation, but also to any contingency for which a licensee may have a response plan in place, such as chemical, fire, and toxic gas emergencies.

14.2 Only dedicated equipment is to be included in the definition. Equipment that is used in normal operation but required to implement a plan is not included here.

14.3 Equipment includes fixed systems, facilities, portable instruments, communications and other equipment called up in the licensee's plan as needing to be available and in a state of readiness. Licensees are expected to produce a list as part of their plans.

14.4 Examples of dedicated equipment are listed in elements 9 and 10 of the document entitled "Recommended Criteria for the Evaluation of On-Site Nuclear Emergency Plans", which was provided to all licensees in 1994. Any equipment in the lists that is used in normal operation would not be applicable.

14.5 Although the equipment covered is not in regular use, the expectation is that it will always be in a state of readiness and in its proper location. Programmes should be established to check regularly if equipment is present and ready.

14.6 The aspect being measured is that tests and inventory checks are done according to a fixed schedule, not whether the test failed or equipment was missing. It is expected that programmes exist to remedy malfunctions and replace that which is missing. Other means are in place to assess these latter aspects of readiness.

14.7 The frequencies chosen for the checks in the call-up schedule should be defendable.

14.8 Pre-determined dates for the call-ups will be used to measure schedule compliance. There will be provision for a grace period only when a licensee justifies it to AECB staff satisfaction.

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**NUMBER OF MINIMUM SHIFT COMPLEMENT NON-COMPLIANCES (7)**
2.	Purpose:	To indicate compliance with the minimum shift complement requirement as identified in the reactor operating licence. To monitor performance in meeting regulatory requirements to ensure adequate staffing for normal operations and emergencies. To compare performance between Canadian CANDU units. To be used as a component in the measurement of an emergency preparedness index, if necessary.
3.	Definition:	The number of shifts, during the quarter, where the minimum shift complement is not met for the unit.
4.	Calculation:	PI = # of shifts without minimum shift complement, during the quarter.
5.	Attribute:	Predictive/Reactive
6.	Coverage:	Program
7.	Performance Areas:	Public Safety, Worker Safety
8.	Primary Area:	Public Safety
9.	Data:	See attached Data Sheet
10.	Data Applicability:	Station
11.	Trending Frequency:	Quarterly
12.	Comparability:	Canadian
13.	Means by which AECB will present data (no licensee input required):	

14. Notes:

14.1 The "minimum shift complement" is defined in terms of staff number with proper authorizations and qualifications and is referenced in the reactor operating licence or supporting licensing submissions for the purpose of normal and abnormal operations, radiation emergencies, fires, special procedures, first aid, search and rescue.

14.2 Records should be able to demonstrate shift staff qualifications and minimum requirements.

14.3 There is no grace period. Failure to satisfy the minimum requirement for the full shift is a failure for that shift.

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**NON-COMPLIANCE INDEX (8)**
2.	Purpose:	To indicate the number of occurrences where the licensee's operation of a unit failed to comply with its Operating Policies and Principles, Radiation Protection Regulations, other Operating Licence conditions, or with other Regulations. To compare performance between Canadian CANDU units.
3.	Definition:	
3.1	A non-compliance (or violation) is a failure to comply with the Physical Security Regulations, the Transport Packaging of Radioactive Materials Regulations, the Atomic Energy Control Regulations or any condition of the Reactor Operating Licence, including documents referenced therein, such as the licensee's OP&Ps or its Radiation Protection Regulations.	
3.2	The index is a composite total in each quarter of all types of non-compliances for a unit in which simultaneous non-compliances of the same safety principle are counted only once.	

4. Calculation:

The number may be represented by an expression that removes any intersections that represent multiple accounting.

Number of Non-Compliances =

$$a + b + c + d$$
$$- (a \cap b) - (b \cap c) - (c \cap d) - (d \cap a)$$
$$- (a \cap c) - (b \cap d)$$
$$+ (a \cap b \cap c) + (b \cap c \cap d) + (c \cap d \cap a) + (d \cap a \cap b)$$
$$- (a \cap b \cap c \cap d)$$

where:

a = number of OP&P non-compliances for a reactor unit plus, for multi-unit stations, those for unit 0 (station-wide);

b = number of RPR non-compliances for a reactor unit plus, for multi-unit stations, those for unit 0 (station-wide);

c = number of other licence non-compliances for a reactor unit plus, for multi-unit stations, those for unit 0 (station-wide);

d = number of non-compliances for a reactor unit of the Physical Security Regulations, the Transport Packaging of Radioactive Materials Regulations, or the Atomic Energy Control Regulations plus, for multi-unit stations, those for unit 0 (station-wide).

5.	Attribute:	Reactive
6.	Coverage:	Global
7.	Performance Areas:	Operations, Maintenance, Public Safety, Worker Safety, Compliance
8.	Primary Area:	Compliance
9.	Data:	See attached Data Sheet
10.	Data Applicability:	Unit
11.	Trending Frequency:	Quarterly
12.	Comparability:	Canadian
13.	Means by which AECB will present data (no licensee input required):	

14. Notes:

14.1 Under sections 2.1, 2.2 and 2.3 of S-99, licensees are required to report all non-compliances defined by 3.1 above.

14.2 Written reports for 1.1(a)-related events are to be submitted no later than 15 calendar days from the discovery of the event.

14.3 The values to be used for the variables a, b, c, and d in the calculation will be based on the date of discovery of the event.

14.4 In instances where AECB and licensee staff disagree on a non-compliance classification, the opinion of the AECB shall prevail.

14.5 For each event reported as non-compliance, the data in the report must indicate which of the four categories (a, b, c, d) apply.

14.6 In multi-unit stations, a non-compliance that affects more than one unit should be recorded as a non-compliance for each unit.

14.7 The presentation of this measurable is capable of showing the composite index as well as the total number of non-compliances in a quarter for each of the four categories.

14.8 Full comparison of this measurable between stations may not be appropriate because the OP&Ps and RPRs vary from station to station.

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**NUMBER OF PRESSURE BOUNDARY DEGRADATIONS** (9)
2.	Purpose:	To indicate the number of pressure boundary degradations and failures which can be attributed or related to the operation and management of each of the CANDU stations. To monitor the performance in meeting nuclear industry codes and standards. To compare performance between Canadian CANDU units.

3. Definition:

Pressure boundary: Any pressure-retaining vessel or system component that is subject to registration or that is registered under the applicable boiler and pressure vessel legislation, whether a conventional system or a nuclear system. (Note: For older stations such as Pickering A this should be "that under the current N285.0 would require registration.")

Pressure boundary degradation: A degradation of the pressure boundary that exceeds a limit that is specified in the design analysis or in the applicable boiler and pressure vessel code, standard or act under which the pressure boundary was registered and includes the following elements currently listed in **AECB regulatory document S-99 section 2.18**:

(a) a pressure boundary excessive deformation, a crack, a hole or a rupture, or a leakage in excess of a limit that is specified in the Operating Policies and Principles;

(b) the occurrence of an abnormal loading transient that exceeds:
A) a pressure boundary design condition, or
B) a Service Level B condition, for any nuclear component that is designed in accordance with rules of ASME III subsection NB;

(c) a change to the size, rating or material property of the pressure boundary beyond that allowed for in the design;

(d) a repair or modification that changes the strength of a component of the pressure boundary that did not receive the prior authorization required by CSA Standard N285.0;

(e) a reduction of the wall thickness beyond that allowed in the design by the applicable pressure vessel code, standard or act under which the pressure boundary was registered; and

(f) degradation of the overpressure protection equipment for the pressure boundary that violates a limit of the overpressure protection report or any other licensing document.

4. Calculation:

Number of pressure boundary degradations:

$$N = a_{n1} + a_{n2} + a_{n3} + a_{n4} + a_c - (b + c)$$

where:

a_{n1} = number of pressure boundary degradations in Class 1 nuclear systems reported under S-99 in a given quarter;

a_{n2} = number of pressure boundary degradations in Class 2 nuclear systems reported under S-99 in a given quarter;

a_{n3} = number of pressure boundary degradations in Class 3 nuclear systems reported under S-99 in a given quarter;

a_{n4} = number of pressure boundary degradations in Class 4 nuclear systems reported under S-99 in a given quarter;

a_c = number of pressure boundary degradations in conventional systems reported under S-99 in a given quarter;

b = number of pressure boundary degradations reported under S-99 in a given quarter on station conventional systems; and

c = number of pressure boundary degradations reported under S-99 in a given time period (quarter, year etc...) which were not attributed or related to the operation of the station (i.e. manufacturing defects, poor original design, etc...) Failures or degradations due to deficiencies in the recent (within 5 years) design of modifications and repairs, as well as failures due to site manufacturing and installation are not included in c.

Note that in the above categorization, classes 1, 2, 3 and 4 refer to what the code class of the failed or degraded component would be under the requirements of the current N285.0.

5.	Attribute:	Predictive/Reactive
6.	Coverage:	Program
7.	Performance Areas:	Operations, Maintenance
8.	Primary Area:	Maintenance

9. Data:	See attached Data Sheet
10. Data Applicability:	Unit
11. Trending Frequency:	Quarterly
12. Comparability:	Canadian
13. Means by which AECB will present data (no licensee input required):	
14. Notes:	

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**PREVENTIVE MAINTENANCE COMPLETION RATIO** (10)
2.	Purpose:	To indicate the fraction of preventive maintenance (PM) jobs to total maintenance jobs completed. To monitor performance in meeting nuclear industry expectations in the area of PM. To compare performance between Canadian CANDU units.
3.	Definition:	Preventive maintenance completion ratio is the ratio of preventive maintenance jobs completed divided by the preventive maintenance plus corrective maintenance jobs completed.
3.1	Preventative maintenance jobs	The PM jobs are jobs performed on equipment in the field, but is in working order when PM job commences. The PM jobs completed shall include those that are frequency or condition based.
3.2	Corrective maintenance jobs	The corrective maintenance (CM) jobs completed shall include data on all maintenance performed as a result of a reported deficiency or failure of equipment in the safety-related system as defined in notes 14.2. It shall not include design modifications.
3.3	Deficiency Reports (DRs)	DRs that are written to correct an identified deficiency in safety-related systems.
4.	Calculation:	$\frac{\text{(PM jobs per quarter)}}{\text{(PM jobs + CM jobs per quarter)}} \times 100 = \%$ PM jobs completed per quarter The data for this indicator shall only include safety related systems as defined by the CSA standards.
5.	Attribute:	Predictive
6.	Coverage:	Program
7.	Performance Areas:	Operations, Maintenance, Public Safety

8.	Primary Area:	Maintenance
9.	Data:	See attached Data Sheet
10.	Data Applicability:	Unit
11.	Trending Frequency:	Quarterly
12.	Comparability:	Station
13.	Means by which AECB will present data (no licensee input required):	
14.	Notes:	

14.1 The indicator requires the total number of PM and CM jobs scheduled to be completed in the quarter.
14.2 PM, CM and DRs to be included in the data shall be from systems identified by the station staff as being safety related according to S-99.
14.3 The term "open" refers to DRs which have been identified but remain to be checked before introducing them into the system for corrective action.
14.4 The term "close" or complete refers to jobs which are completed in the field and marked as complete in the database.

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**NON-COMPLIANCES WITH NUMBER OF SPECIFIC RADIATION PROTECTION PROCEDURES** (11)
2.	Purpose:	To indicate compliance with station specific radiation protection rules and procedures.
3.	Definition:	Indicator is intended to measure the staff adherence to radiation protection. (a) Radiation signposting out of date. (b) Evidence of food and cigarette consumption in Zone 2/3. (c) Improper setup of rubber areas. (d) Whole body monitor contamination incidents not recorded in radiation log.
4.	Calculation:	None
5.	Attribute:	Predictive/Reactive
6.	Coverage:	Program
7.	Performance Areas:	Worker Safety
8.	Primary Area:	Worker Safety
9.	Data:	See attached Data Sheet
10.	Data Applicability:	Station
11.	Trending Frequency:	Quarterly
12.	Comparability:	Station
13.	Means by which AECB will present data (no licensee input required):	

14. Notes:

14.1 The data shall be presented as individual totals for (a) to (d).
14.2 The data provided to the AECB should be auditable.
14.3 In case of Pickering NGS, Pickering NGS "A" and Pickering NGS "B" data are combined as one measure.

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**RADIATION OCCURRENCE INDEX** (12)
2.	Purpose:	To indicate the number and equivalent severity of radiation occurrences which have taken place at each CANDU station. To monitor the performance in meeting the AECB's expectations in the area of worker radiation protection safety. To compare performance between Canadian nuclear generating stations.
3.	Definition:	A radiation occurrence is an occurrence where one or more of the following consequences has occurred: - fixed body contamination exceeding 50 kBq/square metre (1.35 μCi/m^2) has been detected, - an unplanned acute whole body dose (resulting from an external exposure) exceeding 5 mSv (500 mrem) has been received, - an acute intake of radioactive material resulting in an effective dose greater than 2 mSv (200 mrem) has taken place, - an acute or committed dose in excess of any of the limits specified in the Radiation Protection Regulations Part 1 (Ontario Hydro), the Directives de Santé et Normes de Radioprotection (Hydro-Quebec), or the Radiation Protection Regulations (New Brunswick Power) has been received.
4.	Calculation:	Radiation occurrence index = a + 5b + 5c + 50d. where: a = number of occurrences in a quarter where fixed body contamination in excess of 50 kBq/square metre (1.35 μCi/m^2) was measured; b = number of occurrences in a quarter where an unplanned acute whole body dose (resulting from an external exposure) exceeding 5 mSv (500 mrem) was received; c = number of occurrences in a quarter where an intake of radioactive material resulted in an effective dose greater than 2 mSv (200 mrem), normalized to 2 mSv; d = number of occurrences in a quarter where an acute or committed dose in excess of any of the limits specified in the Radiation Protection Regulations Part 1 (Ontario Hydro), the Directives de Santé et Normes de Radioprotection (Hydro-Québec), or the Radiation Protection Regulations (New Brunswick Power) was received.

5.	Attribute:	Predictive/Reactive
6.	Coverage:	Program
7.	Performance Areas:	Worker Safety, Compliance
8.	Primary Area:	Worker Safety
9.	Data:	See attached Data Sheet
10.	Data Applicability:	Station
11.	Trending Frequency:	Quarterly
12.	Comparability:	Canadian
13.	Means by which AECB will present data (no licensee input required):	

14. Notes:

14.1 The values of the weighting factors (1, 5, 5, 50) required to differentiate between the least safety significant radiation occurrences and the most serious ones are not risk-based. They are meant to indicate the degree of radiation protection practices breakdown required for each type of event to occur.

14.2 The total for 'c' above is normalized to 2 mSv. This means that the actual dose received as a result of the occurrence(s) is divided by 2 mSv. For example: two exposures as a result of separate intake incidents, one of 3 mSv and one of 4 mSv, would result in a value for 'c' = 3 mSv/2 mSv + 4 mSv/2 mSv = 1.5 + 2 = 3.5. This value 'c' would then be multiplied by the weighting factor 5.

14.3 Only the number of occurrences with a higher level of consequence will be calculated for a single occurrence to prevent double counting. For example: If a single occurrence results in an unplanned acute whole body dose exceeding 5 mSv (500 mrem), and in the affected workers whole body dose exceeding the quarterly legal limit, the occurrence would be counted as a "d" type of occurrence (the most serious type) and not as one "b" type and one "d" type.

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**UNAVAILABILITY OF SAFETY-RELATED SYSTEMS** (13)
2.	Purpose:	To indicate the actual past unavailability and to predict the future unavailability of safety-related systems for a reactor unit in a quarter (see note 14.1 below). To monitor the performance of safety-related systems in meeting AECB and licensee requirements. To compare performance between Canadian CANDU units in a given station.

3. Definition:

3.1 Actual Past Unavailability: The fraction of a time period during which a system was required to be available but did not meet the minimum performance standards as identified in the Safety Report or other design/operating documents to perform its function if it was called upon to operate.

3.2 Predicted Future Unavailability: The fraction of a time period during which a system is required to be available but is not expected to meet the minimum performance standards as identified in the Safety report or other design/operating documents to perform its function if it is called upon to operate.

3.3 Safety-Related Systems: For this indicator at present, the systems include SDS1, SDS2, ECCS, Containment, Emergency (Service) Water System, Boiler Emergency Cooling System, Standby Generators and Emergency Power System (see note 14.2 below).

4. Calculation:

Unavailability of a system in a reactor unit = a + b

where:

a = unavailability value of the components specific to a unit within a quarter; and

b = unavailability value of the components common to a number of unit(s) within a quarter. This is only applicable to a station with multiple units. For single unit stations, the value of b is zero.

5.	Attribute:	Predictive/Reactive
6.	Coverage:	Global
7.	Performance Areas:	Maintenance, Public Safety, Compliance
8.	Primary Area:	Public Safety

9.	Data:	See attached Data Sheet
10.	Data Applicability:	Unit
11.	Trending Frequency:	Quarterly
12.	Comparability:	Station

13. Means by which AECB will present data (no licensee input required):

14. Notes:

14.1 Licensees are currently required to report the actual past unavailability and predicted future unavailability of SDS1, SDS2, ECCS and Containment. In the future, licensees will be required to report the reliability values for the safety-related systems according to AECB regulatory requirements (currently given in C-98, revision 1, Reliability Requirements for Safety-Related Systems of Nuclear Reactor Facilities).

14.2 At present, the Safety-Related Systems only include those systems identified in section 3.3. In the future these systems may be expanded to include those as required by the AECB regulatory requirements (currently given in C-98, revision 1, Reliability Requirements for Safety-Related Systems of Nuclear Reactor Facilities).

14.3 Currently our licensees do not report System Reliability/Unreliability value according to the regulatory document S-99 because the required mission time of some systems is not yet defined, e.g. ECCS and Containment System.

14.4 At present, the models used in the unavailability calculation vary from station to station. Consequently, it is not appropriate to compare the unavailability values between stations. For meaningful comparison, it is important to have acceptable common models for the unavailability calculations.

14.5 The Actual Past Unavailability should include the unavailability values due to design deficiencies and operational faults found in the specified time period.

14.6 The methodology and the processes of analysis should be auditable.

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**STATION WHOLE BODY DOSE** (14)
2.	Purpose:	To indicate the total dose due to ionizing radiation received by all individuals working at the nuclear station and its related facilities, required to operate the nuclear station. To monitor the performance in meeting a station whole body dose ALARA. To compare performance internationally.
3.	Definition:	The sum of the whole body doses due to ionizing radiation received by individuals (including permanent, part-time and temporary staff, external contractors, consultants etc.) working at the nuclear station and its related facilities, over the year.
4.	Calculation:	
	PI =	$a + b + \sum_{i}^{N} (c_i + d_i)$ ... in units of millisievert; decimals are not required.
	a =	total whole body dose to station personnel from external irradiation during power operation and forced outages, at the nuclear station;
	b =	total whole body dose (actual or committed) to station personnel from internal uptakes during power operation and forced outages, at the nuclear station;
	c_i =	total whole body dose to station personnel from external irradiation during individual unit planned outage i, as applicable; and
	d_i =	total whole body dose (actual or committed) to station personnel from internal uptakes during individual unit planned outage i, as applicable.
	N =	Number of planned outages at the nuclear station during the year.
5.	Attribute:	Predictive
6.	Coverage:	Global
7.	Performance Areas:	Worker Safety
8.	Primary Area:	Worker Safety

9.	Data:	See attached Data Sheet
10.	Data Applicability:	Station
11.	Trending Frequency:	Annually
12.	Comparability:	World
13.	Means by which AECB will present data (no licensee input required):	

14. Notes:

14.1 A unit outage is considered "planned" when preparations and the decision to shutdown the unit have been made at least 6 weeks in advance. For the purposes of convenience to the utility, the dose related to work during unplanned power outages, forced shutdowns or power manoeuvres, or short outages such as poison prevent operation, should be recorded under "station operation" doses (parameters a and b in the equation).

14.2 Doses from neutron exposures should normally be accounted for, in this indicator.

14.3 The internal and external dosimetry programs should satisfy the requirements of the AECB.

14.4 Doses attributed to an outage (measurables c_i and d_i) include the doses directly related to the preparation of the outage, the start-up and related power manoeuvres.

14.5 The results of dose reduction processes can be credited for individual dose commitments, provided that an auditable process is in place.

14.6 For the purposes of the AECB performance indicator program, whole body doses can be considered equivalent to deep doses at Canadian nuclear stations.

14.7 For the purposes of this indicator, doses resulting from activities on a unit which is decommissioned, mothballed or in lay-up is not considered. However, licensees should notify the AECB where significant doses resulting from activities on one of these units could affect station dose.

14.8 Dose commitments to staff resulting from common station services such as Unit zero, heavy water upgrading, or from activities in facilities directly related to the operation of the unit such as laundry, decontamination, fuelling, waste handling, can be accounted under "station operation".

14.9 Doses to visitors, or from initiatives related to public information programs, are considered negligible. However, these doses can be excluded from the total dose, as seen appropriate by the licensee

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**NUMBER OF MISSED MANDATORY SAFETY SYSTEM TESTS** (15)
2.	Purpose:	To indicate successful completion of tests required by licence condition, including those referenced in documents submitted in support of a licence application. To monitor performance in meeting regulatory and licensee availability requirements.
3.	Definition:	The number of missed safety system tests is the sum of those tests that are not completed for each of the three groups of safety-related system (i.e., the Special Safety Systems, the Standby Safety Systems, and other Safety Related Systems) in a quarter.
4.	Calculation:	Number of Missed Tests = a + b + c where: a = number of missed tests reported under 10.10 of S-99 for the SSSs of a unit plus, for multi-unit stations, those for unit 0 (station-wide); b = number of missed tests reported under 10.10 of S-99 for the SbSS of a unit plus, for multi-unit stations, those for unit 0 (station-wide); c = number of missed tests reported under 10.10 of S-99 for other SrS of a unit plus, for multi-unit stations, those for unit 0 (station-wide) Missed tests means tests not completed within the allowable period.
5.	Attribut:	Predictive/Reactive
6.	Coverage:	Program
7.	Performance Areas:	Operations, Public Safety
8.	Primary Area:	Operations
9.	Data:	See attached Data Sheet
10.	Data Applicability:	Unit

11.	Trending Frequency: Quarterly
12.	Comparability: Canadian
13.	Means by which AECB will present data (no licensee input required):
14.	Notes:

14.1 Licence condition A.A.12 requires that tests requested by the Board be completed expeditiously. Unless otherwise directed in writing by the Board, A.A.13 requires licensees to test all systems at a frequency sufficient in the opinion of the Board to substantiate the reliability claimed or implied in the Safety Report or in the documents listed in the application. There is also a specific condition requiring a leak rate test of containment.

14.2 Section 10 of S-99 requires that each licensee make a reliability report annually. Included as sub-section (a) is the requirement for a report on the completion of all tests that were required to be carried out during the reporting period by a licence condition or that were required by a routine test program that was referred to in the licensing documents.

14.3 To comply with A.A.13, licensees have documentation in place that establishes a test program for safety systems, outlining a frequency/time interval for each test.

14.4 The number of missed tests reported under 10.10 of S-99 therefore will provide the data for the calculation.

14.5 For the purpose of this definition, the following shall apply:

Special Safety Systems (SSS) - SDS1, SDS2 (SDSE for PNGS-A), ECC, and Containment;

Standby Safety Systems (SbSS) - Boiler Emergency Cooling, Emergency Power Supply, Standby Generators, Emergency Filtered Air Discharge, Emergency Water, Inter-Unit Feedwater Tie;

Safety Related Process Systems (SrS) - Reactor Regulating, Heat Transport, Moderator, Class I, II, and III, Auxiliary Boiler Feed, Service Water.

This list may be expanded in future.

14.6 All licensees currently report missed tests in the Quarterly Technical Report for the fourth quarter or in their annual Reliability Report.

14.7 Missed tests refer to those not completed, as opposed to those that fail. It is expected that causes of failures are corrected promptly.

14.8 Tests conducted beyond the maximum allowable time interval permitted by the reliability calculation or by an applicable engineering code will count as a miss unless approval has been obtained from the AECB to extend the test interval.

14.9 If provision is made in approved procedures to miss a particular test, it will not be used in the calculation.

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**NUMBER OF UNPLANNED TRANSIENTS** (16)
2.	Purpose:	To indicate the number of reactor power transients which have exceeded or have a potential to exceed the allowable safe operating envelope as defined in the Safety Report, design documents or operating manuals due to equipment failures or operator errros while the reactor is not in a guaranteed shutdown state. To compare operation of Canadian CANDU units.
3.	Definition:	The unplanned transients are the events that result in a change of reactor operating states due to: (a) Unplanned reactor setbacks and stepbacks, both automatic and manual, which occur while the reactor is not in a guaranteed shutdown state. These reactor setbacks and stepbacks are the events resulting from the corrective actions taken by operator or the internal plant equiment failure, spurious signal, human error or external events such as severe weather, earthquake, airplane strike, grid instability, railway explosion, etc. (b) Unplanned reactor trips, both automatic and manual, which occur while the reactor is not in a guaranteed shutdown state. These reactor trips are the result of the events arising from corrective actions taken by operator or internal plant equipment failure, spurious signal, human error, or external events such as severe weather, earthquake, airplane strike, grid instability, railway explosion, etc.
4.	Calculation:	The total number of unplanned transients in a quarter for a particular reactor unit = number of (a) + number of (b) as defined above.
5.	Attribute:	Predictive/Reactive
6.	Coverage:	Global
7.	Performance Areas:	Operations, Public Safety
8.	Primary Area:	Public Safety
9.	Data:	See attached Data Sheet
10.	Data Applicability:	Unit
11.	Trending Frequency:	Quarterly
12.	Comparability:	Canadian

13. Means by which AECB will present data (no licensee input required):

14. Notes:

14.1 The manual reactor trips, setbacks or stepbacks which are required by planned (as opposed to forced) outage maintenance or routine testing should not be included in (a) and (b) above. The manual reactor trip on SDS2 once every two years is one of the examples. The use of manual reactor setback to deal with flux tilt during refuelling is not appropriate and therefore should be included in (a) calculation. (Note: The proper way of operation is to reduce power first then start refuelling to prevent reactor setback, stepback or trip)

14.2 The main function of setback and/or stepback, as installed in the regulating system, is to reduce the number of shutdown system actuations. This is a CANDU design feature. That is why the setback and stepback are included in the calculation of transient numbers which have exceeded or have potential to exceed the allowable safe operating envelope.

14.3 If an event results in a reactor setback, stepback and trip in sequence, then the total transient number will be counted in (b) as 1.0. If an event results in a reactor setback and stepback in sequence, again the total number of transients will be counted in (a) as 1.0.

14.4 If an event results in a reactor trip on both shutdown systems, the number of reactor trips should only be counted as one, even though two shutdown systems are actuated on different trip parameters. This is to take into account that CANDU plants are installed with two shutdown systems, if the number of reactor trips is to be compared internationally.

14.5 After a reset of reactor setback, stepback and/or trip by operator and the reactor power is allowed to increase, if (a) or (b) occurs again due to failure to correct causes of the initial transient, then the subsequent reactor setback, stepback and/or trip should be included in the calculation of the number of unplanned transients.

PERFORMANCE INDICATOR SPECIFICATION SHEET

Rev. date: 1998.06.30

1.	Title:	**UNPLANNED CAPABILITY LOSS FACTOR** (17)
2.	Purpose:	To indicate how a unit is managed, operated, maintained in order to avoid unplanned outages. To compare performance internationally.
3.	Definition:	This measurable is from WANO, Implementing Guideline 19.1 (1993), addendum September 1996. Some of its elements are found under the indicator Unit Capability Factor, found in the same document.
4.	Calculation:	The accounting period considered will be the quarter.
5.	Attribute:	Reactive
6.	Coverage:	Global
7.	Performance Areas:	Operations, Maintenance
8.	Primary Area:	Maintenance
9.	Data:	See attached Data Sheet
10.	Data Applicability:	Unit
11.	Trending Frequency:	Quarterly
12.	Comparability:	World
13.	Means by which AECB will present data (no licensee input required):	
14.	Notes: The same comments and remarks as in the referenced WANO document also apply (attached), WANO IG 19.1 ANR1.OR, September 1996.	

APPENDIX B

AECB PERFORMANCE INDICATOR DATA SHEET

Rev. Date: 1998.06.30

TITLE: ACCIDENT SEVERITY RATE (1)	
STATION:	**QUARTER, YEAR:**
DATA: a = number of days lost during the quarter at the station = b = number of person-hours worked during the quarter at the station = Explanation of data, if required (attach supplementary pages if necessary):	
PREPARED BY:	**DATE:**
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**
FOR AECB USE: accident severity rate = (a / b) x 200000 =	
AECB PREPARED BY:	**AECB VERIFIED BY:**

AECB PERFORMANCE INDICATOR
DATA SHEET
Rev. Date: 1998.06.30

TITLE: CHEMISTRY INDEX (2)		
STATION:	**UNIT NO.:** (Use one data set per unit)	**QUARTER, YEAR:**

DATA:

a_i = number of successful samples during the quarter for parameter i.
A_i = number of required samples during the quarter for parameter i.

PHT pH_a a_1 =
A_1 =

PHT Dissolved $[D_2]$ a_2 =
A_2 =

Annulus Gas $[O_2]$ a_3 =
A_3 =

Steam Generators a_4 =
Dissolved [Cl] A_4 =

Steam Generators a_5 =
$[SO_4]$ A_5 =

Steam Generators a_6 =
[Na] A_6 =

Feedwater Dissolved a_7 =
$[O_2]$ A_7 =

Feedwater Suspended a_8 =
Iron (could be total A_8 =
combined with copper)

Feedwater Suspended a_9 =
Copper A_9 =

Feedwater (or Steam a_{10} =
Generator) A_{10} =
Hydrazine

AECB PERFORMANCE INDICATOR
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TITLE: CHEMISTRY INDEX (CONT'D)		
STATION:	**UNIT NO.:** (Use one data set per unit)	**QUARTER, YEAR:**

DATA:

Condensate Dissolved $[O_2]$ (at extraction pump or HP feedheater outlet)
a_{11} =
A_{11} =

Condensate pH_a (extraction pump)
a_{12} =
A_{12} =

Expianation of data, if required (attach supplementary pages if necessary):

PREPARED BY:	**DATE:**
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**

AECB PERFORMANCE INDICATOR
DATA SHEET
Rev. Date: 1998.06.30

TITLE: CHEMISTRY INDEX (CONT'D)			
STATION:	**UNIT NO.:** (Use one data set per unit)	**QUARTER, YEAR:**	
FOR AECB USE:			
$\frac{a_1}{A_1} \times 100 =$ %	$\frac{a_2}{A_2} \times 100 =$ %	$\frac{a_3}{A_3} \times 100 =$ %	$\frac{a_4}{A_4} \times 100 =$ %
$\frac{a_5}{A_5} \times 100 =$ %	$\frac{a_6}{A_6} \times 100 =$ %	$\frac{a_7}{A_7} \times 100 =$ %	$\frac{a_8}{A_8} \times 100 =$ %
$\frac{a_9}{A_9} \times 100 =$ %	$\frac{a_{10}}{A_{10}} \times 100 =$ %	$\frac{a_{11}}{A_{11}} \times 100 =$ %	$\frac{a_{12}}{A_{12}} \times 100 =$ %
Chemistry index = Average of above percentages = %			
AECB PREPARED BY:		**AECB VERIFIED BY:**	

AECB PERFORMANCE INDICATOR
DATA SHEET
Rev. Date: 1998.06.30

TITLE: COMPLIANCE CHEMISTRY INDEX (3)		
STATION:	**UNIT NO.:** (Use one data set per unit)	**QUARTER, YEAR:**

DATA:

a_i = number of successful samples during the quarter for parameter i.
A_i = number of required samples during the quarter for parameter i.

Gadolinium (or boron) batch isotopic analysis a_1 = A_1 =

LISS poison injection tanks [Gd] a_2 = A_2 =

Moderator D_2O isotopic a_3 = A_3 =

Moderator [H_13] a_4 = A_4 =

Moderator excess reactivity a_5 = A_5 =

Moderator dissolved [D_2] a_6 = A_6 =

Moderator cover gas [D_2] a_7 = A_7 =

PHT D_2O isotopic a_8 = A_8 =

PHT [H_3] a_9 = A_9 =

PHT [I_{131}] a_{10} = A_{10} =

AECB PERFORMANCE INDICATOR
DATA SHEET
Rev. Date: 1998.06.30

TITLE: COMPLIANCE CHEMISTRY INDEX (CONT'D)		
STATION:	**UNIT NO.:** (Use one data set per unit)	**QUARTER, YEAR:**

DATA:

PHT D_2O storage tank cover gas a_{11} =
$[D_2]$ A_{11} =

PHT [Cl] a_{12} =
A_{12} =

Moderator to PHT D_2O isotopic a_{13} =
purity difference check A_{13} =

Annulus gas dewpoint a_{14} =
A_{14} =

End shield cooling water pHa a_{15} =
A_{15} =

For selected stations:

End shield cooling cover gas $[H_2]$ a_{16} =
A_{16} =

ECI HP water tank(s) pHa a_{17} =
A_{17} =

ECI HP water tank(s) hydrazine a_{18} =
concentration A_{18} =

Liquid zone control system cover a_{19} =
gas $[H_2]$ A_{19} =

AECB PERFORMANCE INDICATOR
DATA SHEET
Rev. Date: 1998.06.30

TITLE: COMPLIANCE CHEMISTRY INDEX (CONT'D)		
STATION:	**UNIT NO.:** (Use one data set per unit)	**QUARTER, YEAR:**

DATA:

For all units in guaranteed shutdown state (GSS) during the quarter, or part of the quarter:

b_i =number of successful samples (during GSS) for parameter i.
B_i = number of required samples (during GSS) for parameter i.

LISS poison injection tanks b_1 =
pH_a when SDS2 available B_1 =

[Gd] in moderator b_2 =
B_2 =

Moderator D_2O conductivity b_3 =
(except for G-2) B_3 =

Moderator D_2O pH_a b_4 =
B_4 =

Supplementary parameter(s) b_5 =
sampled B_5 =

Explanation of data, if required (attach supplementary pages if necessary):

PREPARED BY:	**DATE:**
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**

AECB PERFORMANCE INDICATOR
DATA SHEET
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TITLE: COMPLIANCE CHEMISTRY INDEX (CONT`D)			
STATION:	**UNIT NO.:** (Use one data set per unit)	**QUARTER, YEAR:**	
FOR AECB USE:			
$\frac{a_1}{A_1} \times 100 =$ %	$\frac{a_2}{A_2} \times 100 =$ %	$\frac{a_3}{A_3} \times 100 =$ %	$\frac{a_4}{A_4} \times 100 =$ %
$\frac{a_5}{A_5} \times 100 =$ %	$\frac{a_6}{A_6} \times 100 =$ %	$\frac{a_7}{A_7} \times 100 =$ %	$\frac{a_8}{A_8} \times 100 =$ %
$\frac{a_9}{A_9} \times 100 =$ %	$\frac{a_{10}}{A_{10}} \times 100 =$ %	$\frac{a_{11}}{A_{11}} \times 100 =$ %	$\frac{a_{12}}{A_{12}} \times 100 =$ %
$\frac{a_{13}}{A_{13}} \times 100 =$ %	$\frac{a_{14}}{A_{14}} \times 100 =$ %	$\frac{a_{15}}{A_{15}} \times 100 =$ %	$\frac{a_{16}}{A_{16}} \times 100 =$ %
$\frac{a_{17}}{A_{17}} \times 100 =$ %	$\frac{a_{18}}{A_{18}} \times 100 =$ %	$\frac{a_{19}}{A_{19}} \times 100 =$ %	$\frac{a_{20}}{A_{20}} \times 100 =$ % (if required)
$\frac{b_1}{B_1} \times 100 =$ %	$\frac{b_2}{B_2} \times 100 =$ %	$\frac{b_3}{B_3} \times 100 =$ %	$\frac{b_4}{B_4} \times 100 =$ %
$\frac{b_5}{B_5} \times 100 =$ %	$\frac{b_6}{B_6} \times 100 =$ %	$\frac{b_7}{B_7} \times 100 =$ % (if required)	$\frac{b_8}{B_8} \times 100 =$ % (if required)

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TITLE: COMPLIANCE CHEMISTRY INDEX (CONT'D)		
STATION:	**UNIT NO.:** (Use one data set per unit)	**QUARTER, YEAR:**
Compliance chemistry index = Average of above percentages = %		
AECB PREPARED BY:		**AECB VERIFIED BY:**

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TITLE: CHANGE CONTROL INDICES (4)					
STATION:			**QUARTER, YEAR:**		
DATA:					
Parameter	QUARTER:				
	Unit 0	Unit 1	Unit 2	Unit 3	Unit 4
1.0 Number of temporary procedural changes*					
2.0 Number of temporary equipment changes*					
3.0 Number of incomplete permanent equipment changes* (see spec. sheet note number 14.2)					
4.0 Number of equipment or procedural changes over six months old*					
5.0 Number of instances where procedural or equipment change contributed to an event, as recorded by the licensee					

Explanation of unusually high numbers in 4.1, 4.2, 4.3, 4.4 or 4.5 is required (attach supplementary pages if necessary):

*Note: For safety-related (as defined by the utility) systems only (see specification sheet).

PREPARED BY:	**DATE:**
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**

*See specification sheet note number 14.1

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TITLE: CHANGE CONTROL INDICES (CONT'D)	
STATION:	**QUARTER, YEAR:**
FOR AECB USE: (Develop a line chart showing items 4.1, 4.2, 4.3, 4.4 and 4.5 on a quarterly basis). No further calculation or manipulation of data required.	
AECB PREPARED BY:	**AECB VERIFIED BY:**

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TITLE: EMERGENCY PREPAREDNESS DRILL COMPLETION RATIO (5)

STATION:	**QUARTER, YEAR:**

DATA: Table "S": Number of drills scheduled for the year by crew and by drill type.

QTR:	DRILL TYPE 1	DRILL TYPE 2	DRILL TYPE 3	DRILL TYPE 4	DRILL TYPE 5	DRILL TYPE 6
CREW 1						
CREW 2						
CREW 3						
CREW 4						
CREW 5						

Table "C": Number of drills completed quarter-end by crew and drill type.

QTR:	DRILL TYPE 1	DRILL TYPE 2	DRILL TYPE 3	DRILL TYPE 4	DRILL TYPE 5	DRILL TYPE 6
CREW 1						
CREW 2						
CREW 3						
CREW 4						
CREW 5						

Explanation of data, if required (attach supplementary pages if necessary):

PREPARED BY:	**DATE:**
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TITLE: EMERGENCY PREPAREDNESS DRILL COMPLETION RATIO (CONT'D)	
STATION:	**QUARTER, YEAR:**

FOR AECB USE:

c = sum of Table "C"entries, replacing any entry by the corresponding Table "S" value whenever the latter is smaller, unless all are smaller, without exception

=

s = sum of Table "S"entries

=

emergency preparedness drill completion ratio = c / s

=

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TITLE: EMERGENCY RESPONSE EQUIPMENT CALL-UP COMPLETION RATIO (6)	
STATION:	**QUARTER, YEAR:**
DATA: a = number of completed call-ups in a quarter = b = number of scheduled call-ups in the same quarter = Explanation of data, if required (attach supplementary pages if necessary):	
PREPARED BY:	**DATE:**
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**
FOR AECB USE: emergency response equipment call-up completion ratio = a / b =	
AECB PREPARED BY:	**AECB VERIFIED BY:**

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TITLE: NUMBER OF MINIMUM SHIFT COMPLEMENT NON-COMPLIANCES (7)		
STATION:	**UNIT NO.:** (Use one data sheet per unit)	**QUARTER, YEAR:**
DATA: PI = Number of shifts without "minimum shift complement" during the quarter. = Explanation of data, if required (attach supplementary pages if necessary):		
PREPARED BY:	**DATE:**	
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**	
FOR AECB USE:		
AECB PREPARED BY:	**AECB VERIFIED BY:**	

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TITLE: NON-COMPLIANCE INDEX (8)		
STATION:	**UNIT NO.:**	**QUARTER, YEAR:**

DATA: In the table below, list each event where a non-compliance has taken place of an OP&P, RPR, other licence condition, Physical Security Regulation, Transport Packaging of Radioactive Materials Regulations, or the Atomic Energy Control Regulations. For each event, note which of the following non-compliance types are applicable by putting an "X" in the appropriate column. Ensure that a separate line entry is made for any non-simultaneous occurrences that may have transpired during the event.

a ≡ an OP&P non-compliance at the Unit including, for multi-unit stations, any for Unit 0 (station-wide)

b ≡ an RPR non-compliance at the Unit including, for multi-unit stations, any for Unit 0 (station-wide)

c ≡ any other licence non-compliance at the Unit including, for multi-unit stations, any for Unit 0 (station-wide)

d ≡ a non-compliance at the Unit of the Physical Security Regulations, the Transport Packaging of Radioactive Materials Regulations, or the Atomic Energy Control Regulations including, for multi-unit stations, any for Unit 0 (station-wide)

Event	a	b	c	d

Explanation of data, if required (attach supplementary pages if necessary):

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TITLE: NON-COMPLIANCE INDEX (CONT'D)		
STATION:	**UNIT NO.:**	**QUARTER,YEAR:**
PREPARED BY:		**DATE:**
AUTHORIZATION FOR RELEASE TO AECB BY:		**DATE:**

FOR AECB USE:

non-compliance index = total number of lines in the above table where there is at least one "X"

=

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TITLE: NUMBER OF PRESSURE BOUNDARY DEGRADATIONS (9)		
STATION:	**UNIT NO.:** (Use one data set per unit)	**QUARTER, YEAR:**

DATA:

Note: In this data sheet, PBD stands for pressure boundary degradation(s)

a_{N1} = number of PBD in Class 1 nuclear systems, reported under S-99 =

a_{N2} = number of PBD in Class 2 nuclear systems, reported under S-99 =

a_{N3} = number of PBD in Class 3 nuclear systems, reported under S-99 =

a_{N4} = number of PBD in Class 4 nuclear systems, reported under R=99 =

b = number of PBD reported under S-99 on unit conventional systems =

c = number of PBD reported under S-99 in the quarter, which were not attributed to the operation of the station (manufacturing defects, poor original design, etc.). However, failures or degradations due to deficiencies in the recent (within five years) design of modifications and repairs, as well as failures due to site manufacturing and installation are not included in c =

Explanation of data, if required (attach supplementary pages if necessary):

PREPARED BY:	**DATE:**
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**

FOR AECB USE:

$N = a_{N1} + a_{N2} + a_{N3} + a_{N4} + b - (b + c) =$

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TITLE: PREVENTIVE MAINTENANCE COMPLETION RATIO (10)					
STATION:			**QUARTER, YEAR:**		
DATA:					
Parameter	Unit 0	Unit 1	Unit 2	Unit 3	Unit 4
(i) Total number of preventive maintenance jobs completed by quarter.					
(ii) Total number of corrective maintenance jobs completed per quarter.					
(iii) Total number of preventive maintenance jobs planned to be completed in the quarter.					
(iv) Total number of corrective maintenance jobs planned to be completed in the quarter.					
(v) Total number of preventive and corrective maintenance jobs scheduled to be done per calendar year.					
(vi) Total number of deficiency reports per quarter.					
(vii) Total number of open (unverified) deficiency reports per quarter which are defined as design changes.					
Explanation of data, if required (attach supplementary pages if necessary):					
PREPARED BY:			**DATE:**		
AUTHORIZATION FOR RELEASE TO AECB BY:			**DATE:**		

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TITLE: PREVENTIVE MAINTENANCE COMPLETION RATIO (CONT'D)	
STATION:	**QUARTER, YEAR:**

FOR AECB USE:

$\frac{\text{(i)}}{\text{(ii) + (i)}}$ x 100 = % PM jobs done per unit per quarter

AECB PREPARED BY:	**AECB VERIFIED BY:**

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TITLE: NON-COMPLIANCES WITH NUMBER OF SPECIFIC RADIATION PROTECTION PROCEDURES (11)

STATION:	**QUARTER, YEAR:**

DATA:

Provide auditable data relating to the number of instances (per quarter) for the following:
(Please include references for each event for AECB follow-up)

Radiation Protection Procedure	Number of Non-Compliances	Location and Date of Non-Compliance in Each Case	Comments
(a) Radiation signposting out of date			
(b) Evidence of food, drink and cigarette consumption in zones 2 and 3			
(c) Improper setup of rubber areas			
(d) Whole body monitor contamination incidents not recorded in radiation log			

Explanation of data, if required (attach supplementary pages if necessary):

PREPARED BY:	**DATE:**
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**

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TITLE: NON-COMPLIANCES WITH NUMBER OF SPECIFIC RADIATION PROTECTION PROCEDURES (CONT'D)	
STATION:	**QUARTER, YEAR:**
FOR AECB USE:	
AECB PREPARED BY:	**AECB VERIFIED BY:**

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TITLE: RADIATION OCCURRENCE INDEX (12)				
STATION:		**UNIT:**	**QUARTER, YEAR:**	
DATA:				
a	Event Title	Dose Received	Event Date	Licensee's Event No.
b	Event Title	Dose Received	Event Date	Licensee's Event No.
c	Event Title	Dose Received	Event Date	Licensee's Event No.
d	Event Title	Dose Received	Event Date	Licensee's Event No.

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TITLE: RADIATION OCCURRENCE INDEX (CONT'D)		
STATION:	**UNIT:**	**QUARTER, YEAR:**
Note: a, b, c and d are defined in section 4. Occurrence Index = a + 5b + 5c + 50d Explanation of data, if required (attach supplementary pages if necessary):		
PREPARED BY:	**DATE:**	
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**	
FOR AECB USE:		
AECB PREPARED BY:	**AECB VERIFIED BY:**	

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TITLE: UNAVAILABILITY OF SAFETY-RELATED SYSTEMS (13)		
STATION:	**UNIT:**	**QUARTER, YEAR:**

DATA:

Data of SDS1:

Failed Component	Affected Trip Parameter	Actual Past Unavailability	Predicted Future Unavailability*	Event Date	Licensee's Event No.

Data of SDS2:

Failed Component	Affected Trip Parameter	Actual Past Unavailability	Predicted Future Unavailability*	Event Date	Licensee's Event No.

*Data are required only when the actual past unavailability values are greater than design requirements.

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TITLE: UNAVAILABILITY OF SAFETY-RELATED SYSTEMS (CONT'D)					
STATION:		**UNIT:**		**QUARTER, YEAR:**	
DATA:					
Data of ECCS:					
Failed (or affected) Component	Affected Trip Parameter	Actual Past Unavailability	Predicted Future Unavailability*	Event Date	Licensee's Event No.
Data of Containment:					
Failed (or affected) Component	Affected Trip Parameter	Actual Past Unavailability	Predicted Future Unavailability*	Event Date	Licensee's Event No.

*Data are required only when the actual past unavailability values are greater than design requirements.

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TITLE: UNAVAILABILITY OF SAFETY-RELATED SYSTEMS (CONT'D)		
STATION:	**UNIT:**	**QUARTER, YEAR:**

DATA:

Data of Emergency Water System:

Failed (or affected) Component	Affected Trip Parameter	Actual Past Unavailability	Predicted Future Unavailability*	Event Date	Licensee's Event No.

Data of Steam Generator Emergency Cooling System:

Failed (or affected) Component	Affected Trip Parameter	Actual Past Unavailability	Predicted Future Unavailability*	Event Date	Licensee's Event No.

*Data are required only when the actual past unavailability values are greater than design requirements.

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TITLE: UNAVAILABILITY OF SAFETY-RELATED SYSTEMS (CONT'D)					
STATION:		**UNIT:**		**QUARTER, YEAR:**	
DATA: Data of Standby Generators:					
Failed (or affected) Component	Affected Trip Parameter	Actual Past Unavailability	Predicted Future Unavailability*	Event Date	Licensee's Event No.
Data of Emergency Power System:					
Failed (or affected) Component	Affected Trip Parameter	Actual Past Unavailability	Predicted Future Unavailability*	Event Date	Licensee's Event No.
Explanation of data, if required (attach supplementary pages if necessary):					

*Data are required only when the actual past unavailability values are greater than design requirements.

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TITLE: UNAVAILABILITY OF SAFETY-RELATED SYSTEMS (CONT'D)		
STATION:	**UNIT:**	**QUARTER, YEAR:**
PREPARED BY:	**DATE:**	
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**	
FOR AECB USE:		
AECB PREPARED BY:	**AECB VERIFIED BY:**	

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TITLE: STATION WHOLE BODY DOSE (14)						
STATION:					**YEAR:**	
DATA: In units of millisievert, no decimals required						
WHOLE BODY DOSES FROM PLANNED UNIT OUTAGES					**WHOLE BODY DOSES FROM STATION OPERATION INCLUDING SHORT FORCED OUTAGES, EXCLUDING PLANNED UNIT OUTAGES**	**STATION WHOLE BODY DOSE (EXTERNAL, INTERNAL, AND TOTAL)**
	Unit # Outage #	**Unit # Outage #**	**Unit # Outage #**	**Unit # Outage #**		
OUTAGE DURATION (DAYS)						
EXTERNAL (c_i)					a =	
INTERNAL (d_i)					b =	
SUM OF c_i AND d_i ABOVE						
Explanation of data, if required:						
PREPARED BY:					**DATE:**	
AUTHORIZATION FOR RELEASE TO AECB BY:					**DATE:**	

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TITLE: STATION WHOLE BODY DOSE (CONT'D)	
STATION:	**YEAR:**
FOR AECB USE:	
AECB PREPARED BY:	**AECB VERIFIED BY:**

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TITLE: NUMBER OF MISSED MANDATORY SAFETY SYSTEM TESTS (15)		
STATION:	**UNIT NO.:**	**QUARTER, YEAR:**

DATA:

a = number of missed tests reported under 10.10 of S-99 for the SSSs of a unit plus, for multi-unit stations, those for Unit 0 (station-wide)

=

b = number of missed tests reported under 10.10 of S-99 for the SbSSs of a unit plus, for multi-unit stations, those for Unit 0 (station-wide)

=

c = number of missed tests reported under 10.10 of S-99 for the SrSs of a unit plus, for multi-unit stations, those for Unit 0 (station-wide)

=

Explanation of data, if required (attach supplementary pages if necessary):

PREPARED BY:	**DATE:**
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**

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TITLE: NUMBER OF MISSED MANDATORY SAFETY SYSTEM TESTS (CONT'D)		
STATION:	**UNIT NO.:**	**QUARTER,YEAR:**
FOR AECB USE: number of missed mandatory safety system tests = a + b + c =		
AECB PREPARED BY:		**AECB VERIFIED BY:**

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TITLE: NUMBER OF UNPLANNED TRANSIENTS (16)

STATION:	**UNIT:**	**QUARTER, YEAR:**

DATA:
Total hours during which the reactor is in guaranteed shutdown state:

Data of Reactor Trips:

Auto or Manual	SDS1/SDS2 Failed Component	Affected Trip Parameters	% Full Power	Event Date	Licensee's Event No.

Data of Reactor Stepbacks:

Auto or Manual	Failed Component	Affected Trip Parameters	% Full Power	Event Date	Licensee's Event No.

Data of Reactor Setbacks:

Auto or Manual	Failed Component	Affected Trip Parameters	% Full Power	Event Date	Licensee's Event No.

Explanation of data, if required (attach supplementary pages if necessary):

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TITLE: NUMBER OF UNPLANNED TRANSIENTS (CONT'D)		
STATION:	**UNIT:**	**QUARTER, YEAR:**
PREPARED BY:	**DATE:**	
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**	
FOR AECB USE:		
AECB PREPARED BY:	**AECB VERIFIED BY:**	

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TITLE: UNPLANNED CAPABILITY LOSS FACTOR (17)		
STATION:	**UNIT NO.:** (Use one data set per unit)	**QUARTER, YEAR:**

DATA:

Licensee to submit a unit power history for the quarter, preferably as a graph, a brief description of all energy losses (power reduction, duration in hours, reason for the reduction from the reference capacity) and the classification of the energy loss(es) as either unplanned losses, planned losses or losses due to "external" effects.

a = Reference Capacity = MW
b = Reference Period (Quarter) = Hours

Explanation of data, if required (attach supplementary pages if necessary):

PREPARED BY:	**DATE:**
AUTHORIZATION FOR RELEASE TO AECB BY:	**DATE:**

FOR AECB USE:

REG = Reference Energy Generation = a x b = MW hours

UEL = Total Unplanned Energy Losses = MW hours

$$UCLF = \frac{UEL}{REG} \times 100 = \%$$

AECB PREPARED BY:	**AECB VERIFIED BY:**